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MECHANISMS FOR THE EFFECTIVE ORGANIZATION OF TRADE PROCESSES IN THE FRUIT AND VEGETABLE BUSINESS

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ABSTRACT

The article examines the mechanisms for the effective organization of trade processes in the fruit and vegetable business. Using official statistics of the Republic of Uzbekistan, the dynamics, product structure and geographical distribution of fruit and vegetable exports in 2024–2025 are analysed. The study shows that exports grew by 36.9% in 2025 and reached USD 2.1 billion, while the average unit export value increased from about USD 761 to USD 955 per tonne. At the same time, the market structure remains highly concentrated: the Russian Federation accounts for 40.8% of export value, and the value-based Herfindahl–Hirschman index for the main markets equals 2,132. A model of trade process organization is proposed that combines organizational, logistical, digital, financial and institutional mechanisms along the value chain, and practical recommendations for reducing post-harvest losses, increasing value added and diversifying markets are developed.

Keywords

fruit and vegetable business, trade processes, value chain, agro-logistics, cold chain, wholesale market, export diversification, digital trading platform, post-harvest losses

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Introduction

The fruit and vegetable sector is one of the most dynamic segments of the agri-food economy. Unlike grain or industrial crops, fresh produce is perishable, seasonal and highly sensitive to the speed and quality of logistics. Therefore, the efficiency of trade processes – from the procurement of products from farmers to their delivery to retail chains and foreign buyers – largely determines the income of producers, the price paid by consumers and the competitiveness of the country in international markets.

In Uzbekistan, the development of horticulture and high-value agricultural exports is defined as a priority in the Strategy for the Development of Agriculture for 2020–2030 approved by Presidential Decree PF-5853 of 23 October 2019 [1]. In 2025 the country exported 2.2 million tonnes of fruit and vegetable products worth USD 2.1 billion, which is 36.9% more than in the previous year and accounts for 6.3% of total exports [9]. However, a significant part of the potential of the sector is still lost due to weak links between producers and markets, shortage of modern storage and packaging capacities and high concentration of exports in a limited number of markets.

The purpose of the article is to analyse the current state of trade processes in the fruit and vegetable business and to substantiate mechanisms for their effective organization. To achieve this purpose, the following tasks were set: to summarize theoretical approaches to the organization of agri-food trade; to analyse the

dynamics, structure and geography of fruit and vegetable exports; and to develop a model of mechanisms and practical recommendations.

Literature review

The theoretical basis of the study is the value chain concept. M. Porter considered the value chain as a set of activities through which a firm creates value and competitive advantage [2]. R. Kaplinsky and M. Morris extended this concept to the inter-firm level and showed that the distribution of value between participants of a chain depends on their bargaining power and access to markets [3]. G. Gereffi, J. Humphrey and T. Sturgeon identified five types of global value chain governance – market, modular, relational, captive and hierarchical – and demonstrated that in agri-food chains the requirements of large buyers for quality and standards are the main driver of chain coordination [4, p. 78–104].

T. Reardon and co-authors described the ”supermarket revolution” in developing countries and showed that the expansion of modern retail changes the procurement system: retail chains move from spot purchases on wholesale markets to specialized wholesalers, preferred suppliers and private quality standards [5, p. 1140–1146]. For producers, this creates both new opportunities and higher entry barriers.

A special feature of fruit and vegetable trade is the high level of post-harvest losses. A.A. Kader emphasized that reducing post-harvest losses of fresh produce through proper handling, cooling and packaging is often a cheaper way to increase food availability than expanding production [6, p. 2169–2176]. According to FAO estimates, about 14% of food produced globally is lost between harvest and retail, and in Central and Southern Asia losses exceed 20%; fruits and vegetables belong to the product groups with the highest loss levels [7]. In supply chain management theory, S. Chopra and P. Meindl show that the efficiency of perishable product chains depends on the balance between responsiveness and cost, achieved through the design of storage, transport and information flows [8].

Thus, the literature shows that the effectiveness of trade processes in the fruit and vegetable business is determined not by a single factor but by a combination of organizational, logistical, informational, financial and institutional conditions. At the same time, studies that link these mechanisms to the current statistical data on the export structure of Uzbekistan remain limited, which determines the relevance of this research.

Research methodology

The study is based on official data of the Statistics Agency under the President of the Republic of Uzbekistan on fruit and vegetable exports for 2024–2025 [9; 10]. Methods of comparative and structural analysis, calculation of unit export values (USD per tonne) and the Herfindahl–Hirschman index (HHI = Σs_i^2, where s_i is the share of the i-th market in export value, %) were used to assess market concentration. The systems approach and value chain analysis were applied to develop the model of trade process organization.

Analysis and results

In 2024 Uzbekistan exported more than 2.0 million tonnes of fruit and vegetables worth USD 1.5 billion [10]. The geographical distribution of exports by main markets is presented in Table 1.

Table 1

Fruit and vegetable exports of Uzbekistan by main markets, 2024

Market	Volume, thousand t	Value, USD million	Share in value, %	Unit value, USD/t
Russia	815.1	632.9	40.8	776
Kazakhstan	520.5	189.8	12.2	365
Pakistan	124.7	192.3	12.4	1,542
China	144.6	128.6	8.3	889
Afghanistan	67.6	124.4	8.0	1,840
Kyrgyzstan	151.7	57.9	3.7	382
Turkey	28.2	48.3	3.1	1,713
Belarus	22.6	20.3	1.3	898
Iraq	32.9	13.4	0.9	407
Other countries	128.5	141.7	9.1	1,103

Market	Volume, thousand t	Value, USD million	Share in value, %	Unit value, USD/t
Total	2,036.4	1,549.6	100.0	761

Source: compiled and calculated by the author based on the Statistics Agency data [10].

The data show a high degree of market concentration. The Russian Federation accounts for 40.8% of export value and 40.0% of export volume, while the three largest markets (Russia, Pakistan and Kazakhstan) together account for 65.4% of export value. The Herfindahl–Hirschman index calculated for the nine named markets equals 2,132, which corresponds to a moderately concentrated structure. Such dependence on a small number of buyers makes exporters vulnerable to changes in demand, logistics routes and phytosanitary requirements of individual countries.

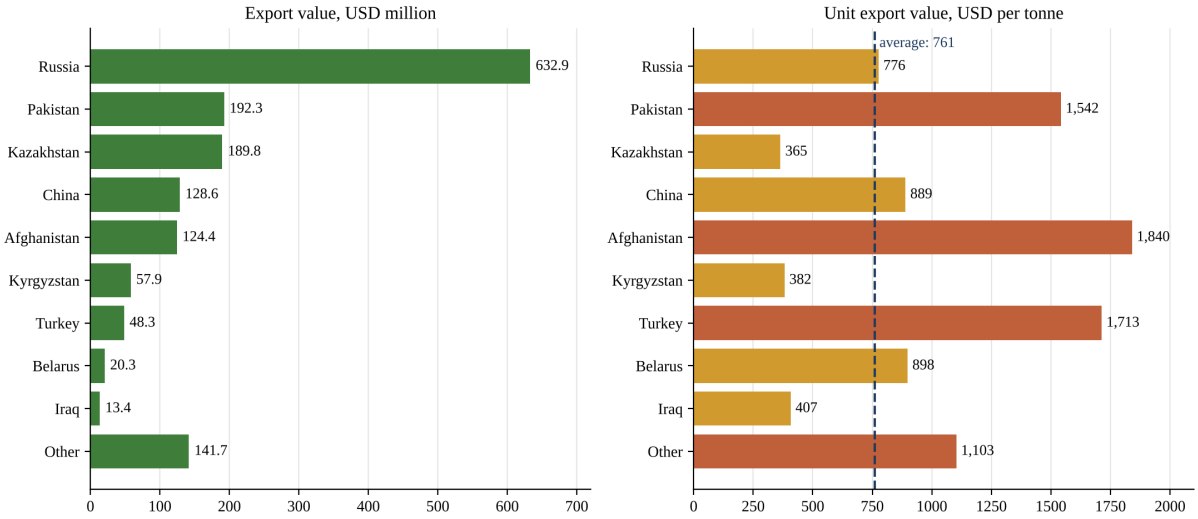


Figure 1. Export value and unit export value of fruit and vegetables by main markets, 2024

Source: compiled by the author based on [10].

The analysis of unit export values reveals another important feature (Figure 1). In the markets of neighbouring countries – Kazakhstan (USD 365 per tonne), Kyrgyzstan (USD 382) and Iraq (USD 407) – the average price is two times lower than the overall average (USD 761), which reflects the dominance of low-processed bulk products. In contrast, exports to Afghanistan (USD 1,840), Turkey (USD 1,713) and Pakistan (USD 1,542) have a much higher unit value, which is associated with the product mix (pulses, dried fruits and nuts) and higher requirements for sorting and packaging. This difference indicates that the main reserve for increasing export revenue lies not only in expanding volumes, but also in moving to higher value segments through grading, packaging, cold storage and processing.

In 2025 the situation improved significantly. Exports reached 2.2 million tonnes and USD 2.1 billion, i.e. grew by 36.9% in value [9]. The average unit export value increased from about USD 761 per tonne in 2024 to about USD 955 per tonne in 2025, or by roughly 25%, which shows a gradual shift towards higher value products. The product structure of exports in 2025 is shown in Figure 2.

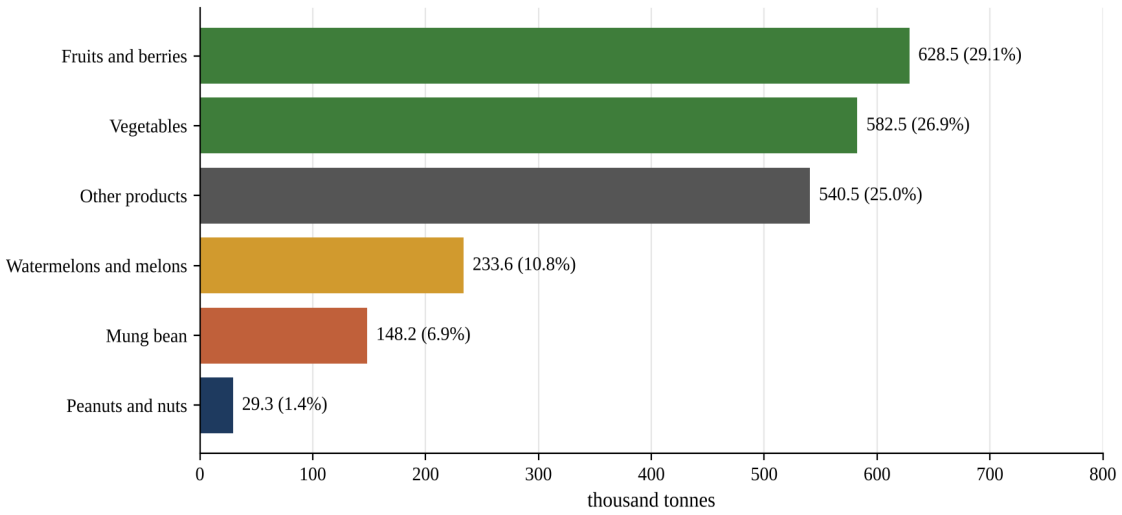


Figure 2. Structure of fruit and vegetable exports of Uzbekistan by product groups, 2025 (thousand tonnes)

Source: compiled by the author based on the Statistics Agency data [9].

Fruits and berries (628.5 thousand tonnes, 29.1%) and vegetables (582.5 thousand tonnes, 26.9%) account for more than half of export volume, followed by watermelons and melons (10.8%) and mung bean (6.9%). Most of these products are highly perishable, which means that the efficiency of trade depends directly on the availability of cold chain infrastructure, consolidated transport and quick customs and phytosanitary procedures.

Based on the analysis and the reviewed theories, a model of mechanisms for the effective organization of trade processes in the fruit and vegetable business was developed (Figure 3). The model distinguishes five stages of the commodity flow – production, collection and sorting, storage and packaging, wholesale trade and sales to retail chains and export buyers – and five groups of mechanisms that support these stages.

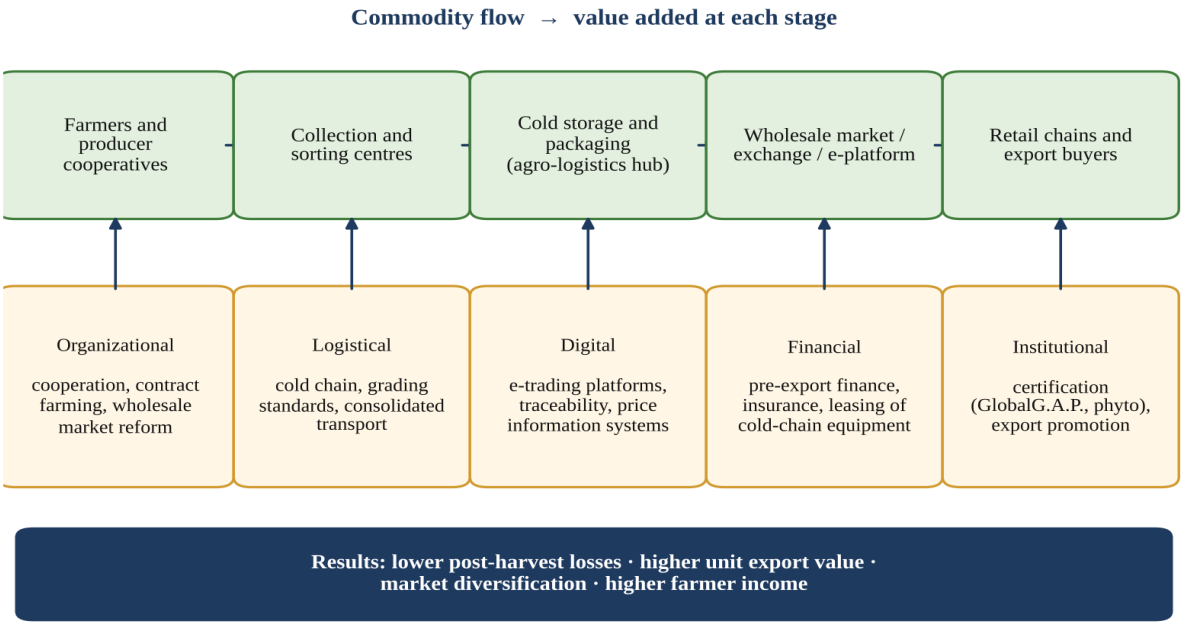


Figure 3. Model of mechanisms for the effective organization of trade processes in the fruit and vegetable business

Source: developed by the author.

Table 2

Mechanisms for the effective organization of trade processes and expected effects

Mechanism	Main instruments	Expected effect
Organizational	producer cooperatives, contract farming with exporters and retail chains, modernization of wholesale markets	stable supply volumes, stronger bargaining power of farmers, lower transaction costs
Logistical	collection and sorting centres, cold storage, packaging lines, consolidated refrigerated transport	reduction of post-harvest losses, longer selling season, access to distant markets
Digital	electronic trading platforms and exchanges, traceability systems, market price information	price transparency, fewer intermediaries, faster settlement
Financial	pre-export financing, crop and cargo insurance, leasing of cold-chain equipment	lower working capital shortages and risks for exporters
Institutional	GlobalG.A.P. and phytosanitary certification, export promotion, trade missions	entry to high-value markets, diversification of export geography

Source: developed by the author based on [3–8].

The organizational mechanism is aimed at overcoming the fragmentation of production. Small farmers individually cannot provide stable volumes and uniform quality required by retail chains and foreign buyers [5]. Producer

cooperatives and contract farming allow volumes to be consolidated, quality standards to be agreed in advance and price risks to be shared. The logistical mechanism plays a key role for perishable products: according to A.A. Kader, proper cooling and handling can significantly reduce losses at relatively low cost [6]. The creation of agro-logistics hubs with cold storage, sorting and packaging lines near production zones allows products to be stored after harvest, sold in the off-season at higher prices and delivered to distant markets.

The digital mechanism includes electronic trading platforms, commodity exchanges and traceability systems. They reduce the number of intermediaries, make prices transparent for farmers and allow buyers to verify the origin and quality of products. The financial mechanism ensures access of exporters to working capital and insurance, while the institutional mechanism – certification according to international standards, export promotion and trade missions – opens access to high-value markets in the European Union, the Middle East and Asia and reduces dependence on a few traditional markets.

Conclusions and recommendations

The study leads to the following conclusions. First, fruit and vegetable exports of Uzbekistan are growing rapidly: in 2025 they reached 2.2 million tonnes and USD 2.1 billion (+36.9%), and the average unit export value increased by about 25%. Second, the export structure remains concentrated: Russia accounts for 40.8% of export value and the three largest markets for 65.4%, while the HHI equals 2,132. Third, exports to neighbouring markets are dominated by low-value bulk products, which indicates significant reserves for increasing value added.

To increase the efficiency of trade processes in the fruit and vegetable business, the following measures are recommended: (1) to develop producer cooperatives and contract farming as the basis for stable supply to retail chains and exporters; (2) to build agro-logistics hubs with cold storage, sorting and packaging capacities in the main production regions on the basis of public-private partnership; (3) to introduce electronic trading platforms and product traceability systems; (4) to expand pre-export financing, insurance and leasing of cold-chain equipment; (5) to support certification of farms and exporters according to international standards in order to diversify export markets and increase the unit export value. The implementation of these mechanisms will reduce post-harvest losses, increase farmers' incomes and strengthen the position of Uzbekistan in international fruit and vegetable markets.

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